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Patent
Case No.: 56784US002

32692
Customer Number

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	KHANDPUR, ASHISH K.		
Application No.:	09/919595	Group Art Unit:	1771
Filed:	July 31, 2001	Examiner:	Chang, Victor S.
Title:	HIGH COHESIVE STRENGTH PRESSURE SENSITIVE ADHESIVE FOAM		

BRIEF ON APPEAL

Mail Stop: Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF MAILING OR TRANSMISSION [37 CFR § 1.8(a)]

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May 23, 2005
Date

Signed by: Sean Edman

Dear Sir:

This is an appeal from the Office Action mailed on September 22, 2004, finally rejecting claims 1-10, 13, 15, and 16. A Notice of Appeal in this application was transmitted to the USPTO by facsimile on December 22, 2004. A petition for a three-month extension of time is submitted herewith, thereby extending the deadline for filing the Appeal Brief to May 23, 2005 since May 22, 2005 fell on a Sunday.

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REAL PARTY IN INTEREST

The real party in interest is 3M Company (formerly known as Minnesota Mining and Manufacturing Company) of St. Paul, Minnesota and its affiliate 3M Innovative Properties Company of St. Paul, Minnesota.

RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals or interferences.

STATUS OF CLAIMS

Claims 1-10, 13, and 15-21 are pending in this application. Claims 17-21 have been withdrawn from consideration. Claims 1-10, 13, 15 and 16 stand rejected. A clean copy of the rejected claims is provided in the attached Claims Appendix.

STATUS OF AMENDMENTS

No amendments have been filed after the final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

The claims at issue all concern foamed pressure sensitive adhesive articles. More specifically, the present invention features a foamed pressure sensitive adhesive (PSA) article comprising a polymeric mixture containing at least one styrenic block copolymer and at least one polyarylene oxide polymer (p. 1, line 21 to p. 4, line 15). The foamed PSA article has high shear strength at high temperatures (i.e. a shear holding power of at least 3000 minutes on anodized aluminum at a temperature of 70°C as determined by ASTM 3654 utilizing a sample with dimensions of 25.4 mm by 12.7 mm supporting a 500 g mass) with little or no cross-linking (i.e. a gel content of less than 25%) (p. 9, lines 14-19).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-10, 13, 15 and 16 stand rejected under 35 USC § 103(a) as purportedly unpatentable over Gehlsen et al (U.S. 6,103,152). This is the only ground of rejection currently pending.

Argument

The present invention provides foamed PSA articles that have high shear strength with little or no crosslinking. In rejecting the instant claims for obviousness, the Examiner relies solely on Gehlsen, which discloses foamed articles that have been crosslinked in order to provide high cohesive strength and/or high modulus. Since, in some embodiments, the articles of the invention may be lightly crosslinked (i.e. gel content below 25%), the Examiner asserts that the present claims are unpatentable, because it would have been obvious to one of ordinary skill in the art, in view of the teachings of Gehlsen, to "lightly" crosslink the adhesive article motivated by a desire to obtain good shear strength. Specifically, the Examiner has stated:

> Gehlsen expressly teaches that "In some cases, e.g., where high cohesive strength and/or high modulus is needed, the foam may be crosslinked" (column 2, lines 5-7). As such, clearly Gehlsen's teaching shows that crosslinking is an optional mean to improve the aforementioned properties, and it would have been obvious to one of ordinary skill in the art to lightly crosslink (i.e., low gel content) the adhesive article, if necessary, since high crosslinking density would be inherently detrimental to its pressure sensitive adhesive property. (Office Action dated 1/21/04, p. 3)

The passage from Gehlsen that was cited by the Examiner (i.e. col. 2, lines 5-7) teaches that the Gehlsen foams are to be crosslinked in situations where high cohesive strength or high modulus is desired. Although Gehlsen teaches that this crosslinking is optional, for example it would not be needed in situations where high cohesive strength and high modulus are not desired, Gehlsen does not teach that high cohesive strength and/or high modulus can be achieved without crosslinking or even with "light" crosslinking as suggested by the Examiner. On the contrary, the technique that Gehlsen discloses for obtaining such properties involves relatively extensive crosslinking.

A careful review of the data presented by Gehlsen reveals that the Gehlsen foams do not exhibit high shear strength in the absence of substantial crosslinking. In particular, in Examples 62-70 of Gehlsen (cols. 22-23), foams were prepared without crosslinking (col. 22, lines 14-15) and the shear strength was measured and reported in Table 2 (col. 23, lines 1-15). All of Gehlsen's non-crosslinked foams exhibited low shear strength with failure occurring in less than 200 minutes under a 1000g load at 25°C (see last column of Table 2). On the other hand, when the Gehlsen foams were crosslinked, they exhibited much higher shear strength, with generally

no failures occurring within 10,000 minutes (see last column of Table 1). Clearly, the data presented by Gehlsen show that Gehlsen's non-crosslinked foams exhibit very low shear strength compared to the crosslinked foams. Only when Gehlsen's foams were substantially crosslinked did they exhibit a high shear strength. Thus, Gehlsen describes crosslinked foams that have high shear strength, and non-crosslinked foams that have low shear strength, but Gehlsen does not describe a foam article that is non-crosslinked or "lightly" crosslinked and yet has high shear strength.

In contrast, the present invention provides foams that have both a low gel content (i.e. relatively little crosslinking) and high shear strength. In particular, independent claims 1, 13 and 16 of the present application recite a foam with a gel content less than 25% that has a shear holding power of at least 3000 minutes at 70°C as determined by ASTM 3654 with a 500g load. As discussed above, the only Gehlsen foams that exhibited high shear strength were those that had been extensively crosslinked (see Table 1). Gehlsen's non-crosslinked foams (Examples 62-70), shown on table 2 all exhibited low shear strength. Indeed, the shear strength test used by Gehlsen was performed at 25°C and thus the shear strength of these foams would be expected to be even lower when measured at the higher temperature conditions (70°C) recited in the present claims. For these reasons, Gehlsen fails to teach or suggest a foamed article that has little or no crosslinking (i.e. low gel content) while still exhibiting the high degree of shear strength recited in the present claims.

The Examiner appears to acknowledge that Gehlen does not disclose any means for achieving high adhesive strength and/or high modulus with no crosslinking, or even with "light" crosslinking. (Office Action mailed 9/22/04, pp.3-4). Nevertheless, the Examiner asserts "...it would have been obvious to one of ordinary skill in the adhesive art to lightly crosslink the adhesive article to a suitable degree (i.e. low gel content), since high crosslinking density (i.e. high gel content) would be inherently detrimental to its pressure sensitive adhesive properties. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art." (Office Action mailed 9/22/04, p. 3). From these statements, it appears to be the Examiner's position that the present invention involves merely the discovery of an optimum level of crosslinking, i.e. a level of crosslinking in which the article is sufficiently crosslinked to improve high temperature performance, but not crosslinked so much that the adhesive properties of the article have been

compromised. However, the present invention does not involve the discovery of an optimum range or level of crosslinking. Instead, the present invention provides an alternative means to achieve high temperature performance in a foamed article without the need to crosslink. Although the presently claimed articles may optionally have some "light" crosslinking (i.e. gel content below 25%) this low level of crosslinking is not what provides the recited high temperature performance. Rather, such performance is accomplished, for example, via the formation of a network of microphase separated domains formed by the hard styrenic blocks being swollen by the polyarylene oxide (see page 2 of the specification). Thus, unlike Gehlsen, the present invention does not rely on crosslinking to provide high temperature performance, and therefore, cannot be considered an optimization of the Gehlsen technique. With the present invention, good shear performance at high temperature can be achieved for the first time without the drawbacks of extensive crosslinking identified by the Examiner (i.e. intereference with PSA properties).

Gehlsen does not teach or suggest that high cohesive strength and/or high modulus can be achieved without crosslinking or even with "light" crosslinking, and Gehlsen fails to describe any means for obtaining these properties without extensive crosslinking. Furthermore, there is nothing in Gehlsen that would lead one of ordinary skill in the art to reasonable expect that the shear strength recited in the present claims could be achieve with only "light" crosslinking. Applicants discovery of an alternative means for providing such properties under high temperature conditions without the need to crosslink the material thus constitutes a non-obvious improvement of the foams described in Gehlsen and is more than a mere optimization of the Gehlsen methods.

In support of Applicants' arguments that the present invention involves more than a mere optimization of the Gehlsen methods, Applicants previously submitted a Declaration under 37 C.F.R § 1.132 signed by Dr. Ashish K. Khandpur (the "Khandpur Declaration"), an inventor of the presently claimed invention and an individual skilled in the relevant art. In particular, Dr. Khandpur states that "since extensive crosslinking is the conventional means for providing foamed articles with shear strength that is described by the Gehlsen patent, it would require more than mere optimization of the methods taught by Gehlsen for one of ordinary skill in the art to obtain a pressure sensitive adhesive foam article having a high shear strength ... with little or no crosslinking." (Khandpur Declaration, ¶ 9).

In addition, the Khandpur Declaration (¶ 7) supports Applicants' analysis of Examples 62-70 of Gehlsen (cols. 22-23), which describe foams that were prepared without crosslinking (col. 22, lines 14-15). All of these non-crosslinked foams exhibited low shear strength with failure occurring in less than 200 minutes under a 1000g load at 25°C (see 6th column of Table 2; col. 23, lines 1-15). In contrast, when the Gehlsen foams were crosslinked, they exhibited much higher shear strength, with generally no failures occurring within 10,000 minutes (see 12th column of Table 1). Thus, the Gehlsen foams only exhibited high shear strength when they were substantially crosslinked, and exhibited very low sheer strengths when they were not. Moreover, the shear strength test used by Gehlsen was performed at 25°C and thus the shear strength of these foams would be expected to be even lower when measured at the higher temperature conditions (70°C) recited in claims 1, 13, and 16 of the present invention. Thus, a skilled artisan desiring to provide a foamed article having high shear strength would have been motivated by Gehlsen to extensively crosslink the foamed article, especially if high temperature performance was desired. Nothing in Gehlsen suggests an alternative means for providing high shear strength. Moreoever, a skilled artisan would not have had a reasonable expectation that high shear strength at high temperature conditions could have been successfully achieved without extensive crosslinking

The present invention, on the other hand, provides a foamed article that has high shear strength at high temperature conditions without the need to crosslink the material. Although the foams of the present invention may optionally be subjected to a small degree of crosslinking this crosslinking is completely unnecessary in order to provide high temperature performance, and extensive crosslinking is to be avoided (i.e. gel content less than 25%). Gehlsen fails to teach or suggest a foamed article that has little or no crosslinking (i.e. low gel content) while still exhibiting the high degree of shear strength recited in claims 1, 13 and 16, nor does Gehlsen teach any method for achieving such performance without crosslinking.

For these reasons, applicants submit that the rejection of claims 1-10, 13, 15 and 16 under 37 U.S.C. §103 as being unpatentable over Gehlsen should be reversed.

Conclusion

For the foregoing reasons, appellants respectfully submit that the Examiner has erred in rejecting this application. Please reverse the Examiner on all counts.

Respectfully submitted,

May 23, 2005
Date

By: _____
Sean J. Edman, Reg. No.: 42,506
Telephone No.: (651) 575-1796

Office of Intellectual Property Counsel
3M Innovative Properties Company
Facsimile No.: 651-736-3833

CLAIMS APPENDIX

1. A foamed pressure sensitive adhesive article, the article comprising:

a) a polymeric mixture containing at least one styrenic block copolymer and at least one polyarylene oxide polymer, wherein the weight ratio of the polyarylene oxide polymer to styrenic blocks is between 0.05 to 5.0; and

b) one or more expandable polymeric microsphere(s);

wherein the foamed pressure sensitive adhesive article has a gel content of less than 25 percent, and a peel strength greater than 100 N/dm on polypropylene for an adhesive thickness of about 1.14 mm, and a shear holding power of at least 3000 minutes on anodized aluminum at a temperature of 70°C as determined by ASTM 3654 utilizing a sample with dimensions of 25.4 mm by 12.7 mm supporting a 500 g mass.

2. The foamed pressure sensitive adhesive article of claim 1, wherein the styrenic block copolymer comprises a diene copolymer.

3. The foamed pressure sensitive adhesive article of claim 1, wherein the styrenic block copolymer comprises an isoprene copolymer.

4. The foamed pressure sensitive adhesive article of claim 1, wherein the styrenic block copolymer comprises a butadiene copolymer.

5. The foamed pressure sensitive adhesive article of claim 1, wherein the styrenic block copolymer comprises a polymodal asymmetric block copolymer.

6. The foamed pressure sensitive adhesive article of claim 1, wherein the polyarylene oxide polymer has a softening temperature of at least 110° C.

7. The foamed pressure sensitive adhesive article of claim 1, wherein the polyarylene oxide polymer comprises polyphenylene ether.

8. The foamed pressure sensitive adhesive article of claim 1, wherein the polyarylene oxide polymer comprises poly(2,6-dimethyl-1,4-phenylene ether).

9. The foamed pressure sensitive adhesive article of claim 1, further comprising a tackifier.

10. The foamed pressure sensitive adhesive article of claim 1, further comprising at least one of a chemical blowing agent or a physical blowing agent.

13. A foamed pressure sensitive adhesive article, the article comprising:

at least one styrenic block copolymer and at least one polyarylene oxide; wherein the article is a pressure sensitive adhesive foam that has a shear holding power of at least 3000 minutes on anodized aluminum at a temperature of 70°C as determined by ASTM 3654 utilizing a sample with dimensions of 25.4 mm by 12.7 mm supporting a 500 g mass, and a gel content of less than 25 percent of crosslinkable material;

and wherein the foamed pressure sensitive adhesive article comprises one or more expanded polymeric microsphere(s).

15. The foamed pressure sensitive adhesive article of claim 13, wherein the polyarylene oxide comprises poly(2,6-dimethyl-1,4-phenylene ether).

16. A foamed pressure sensitive adhesive article, the article comprising:

at least one styrenic block copolymer and at least one polyarylene oxide; wherein the article is a pressure-sensitive adhesive foam that has a shear holding power that is at least 100 percent more than that of a chemically uncrosslinked foam of a similar composition but without polyarylene oxide when tested on anodized aluminum at a temperature of 70°C as determined by ASTM 3654 utilizing a sample with dimensions of 25.4 mm by 12.7 mm supporting a 500 g mass, and a gel content of less than 25 percent of crosslinkable material.

EVIDENCE APPENDIX

Attached hereto is a Declaration Under 37 C.F.R. 1.132 by Ashish K. Khandpur, the first named inventor of the claimed invention, previously submitted by Applicants in response to the rejection of claim 1-10, 13, 15 and 16 under 35 U.S.C. 103(a) as being unpatentable over Gehlsen et al. (U.S. Patent No. 6,103,152). This Declaration was filed with the USPTO on July 21, 2004 and considered by the Examiner in an Office Action dated September 22, 2004.

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DECLARATION UNDER 37 C.F.R. 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF TRANSMISSION
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I hereby certify that this correspondence is being facsimile transmitted to the U.S. Patent and Trademark Office on:

July 21, 2004
Date

Sean J. Edman
Signed by: Sean J. Edman

Dear Sir:

I, Ashish K. Khandpur, in response to the rejection of claims 1-10, 13, 15 and 16 under 35 U.S.C. §103(a) as being unpatentable over Gehlsen et al. (U.S. Patent No. 6,103,152), hereby declare that:

1. In 1989 I received a Bachelor of Technology degree in Chemical Engineering from Indian Institute of Technology (IIT), New Delhi , and in 1995 I received a Ph.D. in Chemical Engineering from University of Minnesota, Minneapolis.

2. I have been working in the field of polymer science for 14 years, and have been employed by 3M Company (3M), St. Paul, Minnesota for the past 9 years. Currently, I hold the position of Senior Technical Manager.

3. I am a named inventor in the above-identified patent application.

4. I have read U.S. Patent No. 6,103,152 issued to Gehlsen et al. (the "Gehlsen patent").

5. The Gehlsen patent describes polymer foam materials that include a plurality of expandable polymeric microspheres.

6. The Gehlsen patent does not disclose that the foamed articles can possess a high cohesive strength and/or high modulus without crosslinking or even with "light" crosslinking which would result in good high temperature (70°C) shear performance. Gehlsen fails to describe any way to achieve these properties without extensive crosslinking.

7. Examples 62-70 of the Gehlsen patent (cols. 22-23) describe foams that were prepared without crosslinking (col. 22, lines 14-15) and the shear strength was measured and reported in Table 2 (col. 23, lines 1-15). All of Gehlsen's non-crosslinked foams exhibited low shear strength with failure occurring in less than 200 minutes under a 1000g load at 25°C (see 6th column of Table 2). On the other hand, when the Gehlsen foams were crosslinked, they exhibited much higher shear strength, with generally no failures occurring within 10,000 minutes (see 12th column of Table 1). In my view, the data presented by the Gehlsen patent show that Gehlsen's non-crosslinked foams exhibited very low shear strength compared to the crosslinked foams. Only when Gehlsen's foams were substantially crosslinked did they exhibit high shear strength. The Gehlsen patent thus fails to describe or suggest a foamed article that is substantially non-crosslinked yet has high shear strength.

8. In contrast, the pending application claims a foamed pressure sensitive adhesive article that exhibits high shear strength without the need to be crosslinked.

9. In my view it would not have been obvious to one of ordinary skill in the art, having in hand the teaching of the Gehlsen patent at the time the present invention was made, that foamed articles such as those claimed in the present application could have been prepared having high shear strength with little or no crosslinking. On the contrary, based on the teaching of Gehlsen, a skilled artisan

would have considered necessary to extensively crosslink the foam in order to provide it with high shear strength.

10. Since extensive crosslinking is the conventional means for providing foamed articles with high shear strength that is described by the Gehlsen patent, it would require more than mere optimization of the methods taught by Gehlsen for one of ordinary skill in the art to obtain a pressure sensitive adhesive foam article having a high shear strength (i.e. a shear holding power of at least 3000 minutes on anodized aluminum at a temperature of 70°C as determined by ASTM 3654 utilizing a sample with dimensions of 25.4 mm by 12.7 mm supporting a 500 g mass) with little or no crosslinking (i.e. a gel content a gel content of less than 25 percent), such as that claimed in the present application.

11. For the above reasons, it is my view that the foamed articles claimed in the present application are not rendered obvious by the Gehlsen patent.

12. All statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: July 21, 2004

Ashish K. Khandpur

DUPLICATE

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